Chlorine Residuals Required in Distributioin Systems

Oct-13

State	Residual Requirement
Alabama	Alabama requires 0.2 mg/l of free residual chlorine.
Arizona	For surface water PWSs, Arizona requires chlorine to be "detectable" (e.g., a chlorine result of ≥ 0.01 mg/L would be deemed detectable) in at least 95% of samples collected in the distribution system.
Arkansas	Arkansas enforces the SWTR requirements. We do not have any additional state requirement concerning chlorine residuals.
California	California requires a minimum of 0.2 mg/l.
Colorado	For both groundwater and surface water systems we require 0.2 mg/L at entry points, and a "detectable" residual throughout the distribution system.
Delaware	*Delaware requires 0.3 ppm free available chlorine throughout the distribution system.*
Florida	Florida rules require a minimum of .2 mg/L free chlorine or .6 mg/L chloramine residual at all times throughout the entire distribution system.
Georgia	Georgia's Rules for Safe Drinking Water is 0.2 mg/L disinfectant residual.
Hawaii	Hawaii has no requirements (other than SWTR) for regulated systems to chlorinate or maintain a residual in their DS.

Illinois	We require a minimum free chlorine residual of 0.2 mg/l or a minimum combined residual of 0.5 mg/l in all active parts of the distribution system at all times.
Iowa	Iowa has required since the 1970's a minimum free residual chlorine of 0.3 mg/l or a combined chlorine of 1.5 mg/l in all parts of the distribution system. There is also a provision to let it fall below this level in small diameter low use areas such as those served by dead in mains. However, they are still required to maintain a measurable chlorine residual.

Kentucky	**401 KAR 8:150. Disinfection, filtration, and recycling.** (a) A public water system that uses chlorine shall: 1. Use continuous automatic disinfection by chlorination; 2. Provide a minimum free chlorine residual of two-tenths (0.2) milligrams per liter, or ppm, throughout the distribution system measured as described in subsection (2) of this section; (b)1. Disinfecting agents other than chlorine may be used pursuant to 40 C.F.R. 141.172(c). 2. If chloramination is used, a minimum combined residual of five-tenths (0.5) milligrams per liter, or ppm, shall be provided throughout the distribution system. KY requires that the minimum chlorine residual level be present at all points in the distribution system. Also note that in KY, both surface and groundwater is disinfected
Massachusetts	The Massachusetts Department of Environmental Protection, Drinking Water Program,MassDEP/DWP, follow the SWTR requirements. In accordance with this requirement, the residual disinfectant concentration in the water entering the distribution system, cannot be less than 0.2 mg/l for more than four hours. The residual disinfectant concentration in the distribution system measured as free chlorine, total chlorine,*combined chlorine, or chlorine dioxide, cannot be* ***undetectable*** *in more than 5% of the samples each month,* for any two consecutive months that the system serves water to the public (See 310 CMR 22.20A(3) 3,4. Based on the DPD Ferrous Titrimetric, DPD Colorimetric and Amperometric Titration Methods for chlorine detection (4500), as described in Standards Methods for the Examination of Water and Wastewater, the minimum detectable concentration of chlorine is 18 ug of Cl as Cl2/L.
Michigan	We only require “detectable levels” in the distribution systems of Subpart H water plants per the Surface Water Treatment Rules. We do not have any minimum levels for groundwater systems.
Minnesota	Community Surface Water: For systems using chloramines as a secondary disinfectant we are recommending a minimum total chlorine of 2 ppm leaving the plant and maintain a total residual of 0.8 – 1.0 ppm in the distribution system. For systems using free chlorine we are recommending a 0.5 mg/L minimum residual throughout the system. NonCommunity Surface Water: We generally define “detectable” as 0.2 milligrams per liter (since most measure with a color wheel). We recommend they maintain 0.5 mg/L free chlorine residual as a minimum.

Mississippi	Mississippi strongly recommends 0.5 mg/l at the end of the distribution lines. We have been willing to let it go to 0.3 mg/l without citing it as problem.
Missouri	Missouri requires a .2ppm residual in 95% of the TCR samples each month. This applies to public water systems required to disinfect. This includes surface water systems, GUI, iron removal and lime softening plants and TCR/GWR systems who've triggered disinfection.
Montana	Montana follows the federal requirement of "detectable". If a system is having a documented problem in the distribution system we have required higher levels, but that is on a case-by-case basis.
Nebraska	For systems using surface water sources or sources that are groundwater under the direct influence of surface water, the requirements are: a. 0.2 ppm residual for free chlorine or 0.5 ppm for total chlorine or 0.1 ppm residual for free chlorine or b. 0.25 ppm for total chlorine provided the requirements listed after the * below are met, or c. HPC of <500 cfu/ml. For systems using groundwater and disinfecting continuously with chlorine or chloramines, the requirements are: a. 0.1 ppm residual for free chlorine or b. 0.05 ppm for free chlorine if the requirements listed after the * below are met, or c. HPC <500 cfu/ml. * In order to maintain the lower minimum residual listed above, the system must meet the following criteria: 1. A system using a surface water source or source that is groundwater under the direct influence of surface water must meet CT inactivation requirements and turbidity requirements of the Surface Water Treatment Rule, IESWTR, and LT1 ESWTR. 2. The system must demonstrate that the field test method being use can consistently, reliably, and precisely measure residuals less than or equal to the specified limit being used. 3. The system must document that the manufacturer's recommendations for calibration or standardization are being done according to manufacturer's specifications and frequency. 4. The system must demonstrate that there is no interference with the testing method, or document that interference has been corrected for. *[Several methods are listed in the regulation.]*
Nevada	In Nevada, our current regulations says systems are supposed to measure to the nearest 0.05 mg/L. Therefore, we use 0.05 mg/L as the detectable value for chlorine.
New Jersey	For Subpart H systems, NJ defines detectable residual as 0.05 ppm chlorine or HPC less than 500cfu/ml.

North Carolina	0.2 free chlorine and 1.0 chloramines at the entry point and TCR sampling sites. “Detectable” at the MRT, as calculated and set forth in 40 CFR 141.72(a)(4) and (b)(3)
Ohio	noncommunity public water systems serving a population of at least one thousand people and all community public water systems shall maintain a minimum chlorine residual of at least two-tenths milligram per liter free chlorine, or one milligram per liter combined chlorine measured at representative points throughout the distribution system. The director may require higher residuals as necessary to compensate for pH, temperature, or other characteristics of the delivered water
Oklahoma	***252:631-3-3. Disinfection requirements*** *. . . .(c)* ***Chlorine.*** *The minimum free chlorine residuals shall be as follows: (1)* ***Most distant points.*** *The minimum free chlorine residual at the most distant points in a water distribution system must be 0.2 mg/l. (2)* ***Point of entry.*** *The minimum free chlorine residual at the POE shall be at 1.0 mg/l. For supplies that document they meet or exceed the inactivation requirements in OAC 252:631-3- 3(a)(1), the minimum free chlorine residual at the POE shall be 0.2 mg/l. (d)* ***Chloramines. . . .*** *(5)* ***Total chlorine.*** *The minimum total chlorine residual at the most distant points in a water distribution system must be 1.0 mg/l and at least 2.0 mg/l at the POE. Higher residuals may be required depending on pH, temperature and other characteristics of the water.*
Oregon	Oregon requires a "detectable" residual be maintained.

Pennsylvania	PA is consistent with the federal rule for the SWTR. Surface water systems must maintain a detectable residual, which is defined as at least 0.02 mg/L. However, we also established disinfectant residual requirements for all other CWSs (GW systems) – CWSs shall maintain a residual throughout the distribution system that is acceptable to the department. For all intents and purposes, this is a detectable residual of at least 0.02 mg/L, unless we have established a more stringent standard through a permit or Order. With the RTCR rule package, we are intending to strengthen our secondary disinfection requirements in the distribution system. This is primarily due to the work we've been doing with Distribution System Optimization and our response to Legionella outbreaks. We will be considering something in the range of 0.2 – 0.5 mg/L (free) and at least 1.0 mg/L (total) at all points in the distribution system.
Rhode Island	For surface water supplied systems, we require a detectable chlorine residual. For systems with chronic coliform problems where we have required BAT for coliform, we require 0.2 mg/l free chlorine at no less than 90% of the routine TCR sites. Otherwise we do not require a chlorine residual be maintained.
Tennessee	We require 0.2 ppm free chlorine to be maintained throughout the distribution system.
Texas	Per Title 30 Texas Administrative Code Chapter 290 Section 110 (b)(4) Texas requires all public water system, not just surface water systems, to maintain a minimum disinfectant residual within the distribution system of 0.2 mg/L free chlorine or 0.5 mg/L chloramine.
Utah	We require a detectible residual in the distribution system.
Vermont	Short answer: whatever the EPA rules require. If 4 log inactivation is required due to vulnerabilities, the level is usually 0.2 ppm or higher (case by case call of course). "Detectable" in practical reality is 0.1, because most systems are still using the colorimetric method for reporting free (or total) chlorine residual.

Washington	As written in our rule (WAC 246-290-451 (7)), *Maintain a detectable residual disinfectant concentration in all active parts of the distribution system, measured as total chlorine, free chlorine, combined chlorine, or chlorine dioxide.*
West Virginia	WV requirement is to maintain a total chlorine residual in the distribution system of at least 0.2 mg/L.
Wisconsin	detectable

Additional Notes

Colorado required all groundwater systems to disinfect as well. We do not believe that results below 0.2 mg/L are reliable. We are going to try and change our regulations to raise the minimum to 0.2 mg/L, but I suspect we will run into opposition and it is uncertain if we will be successful

391-3-5-.14 Operation (2) Continuous Chlorination. The supplier of water must continuously chlorinate the water to maintain a detectable residual of free chlorine in all parts of the distribution system in the recommended amount of at least 0.2 parts per million, and such additional amounts as may be determined necessary by the Division, unless other means of disinfection have been approved by the Director. If the residual disinfectant concentration is measured by approved analytical methods and not detected, the supplier may, upon approval by the Division, determine and report detectability by the use of heterotrophic plate count measurements as required by 40 CFR § 141.72 (1989) and other applicable paragraphs of 40 CFR Part 141.

small community water systems (of the roughly 1,800 CWSs) with disinfection exemptions. While the law allows systems up to 5,000 populations, I don't believe we have any left that have a population of 500. To obtain (and maintain) an exemption a water system must demonstrate the following: **(1)** The population of the community served is not more than 5,000; **(2)** Has as its only source of raw water one or more properly constructed wells into confined geologic formations not subject to contamination; **(3)** Has no history of persistent or recurring contamination, as indicated by sampling results which show violations of finished water quality requirements, for the most recent five-year period; **(4)** Does not provide any raw water treatment other than fluoridation; **(5)** Has an active program approved by the Agency to educate water supply consumers on preventing the entry of contaminants into the water system; **(6)** Has a certified operator of the proper class, or if it is an exempt community public water supply, has a registered person responsible in charge of operation of the public water supply; **(7)** Submits samples for microbiological analysis at twice the frequency specified in the Illinois Pollution Control Board regulations; and **(8)** A unit of local government

Furthermore, as a double check, in MA,water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement.

Our regulations do require a “detectable” disinfectant residual in the distribution system in at least 95% of readings taken when coliform samples are collected, but the disinfectant concentration requirements vary by source type. Requirements of an administrative order supersede the requirements listed above. We believe that these minimum chlorine residual requirements are appropriate for our water systems, but state programs in warmer parts of the country may determine that higher concentrations of chlorine are required to reduce the likelihood of microbial growth in the distribution system.

Chlorination is not mandatory in NV.

There was confusion in the past about how the SWTR requirements impacted regulation. We made it clear with the following note in the rules that BOTH may apply. [Comment: Rule 3745-81-72 of the Administrative Code establishes similar but separate requirements for disinfection of systems using a surface water source. These two requirements are not inconsistent and failure to comply with either is considered a separate violation with different consequences. Contact your district office representative if you have questions or require clarification.]

ODEQ's regulations are available on its website at www.deq.state.ok.us

We tried to raise it a few years ago but got major pushback from systems already dealing with disinfection byproduct issues and also systems not wanting added treatment costs.

In many of our Surface Water Treatment systems the utility supplements their source capacity with groundwater wells. Many of those wells are untreated which presents problems for utilities in this situation from maintaining even a detectible residual in all parts of the distribution system.

From a practical point of view, the guidance we provide purveyors is to target their dosage so that they maintain at least 0.2 mg/l of free chlorine in the distribution system. We feel that anything less might be ineffective (after all, the purveyor installed treatment to ensure a certain outcome), and the prevailing method of measuring free chlorine residual (color comparator DPD field test kit) can only really be read accurately down to 0.2 mg/l, below which the eye can't really see any color change.